

REMARKS

Claims 29, 31-45, and 47-50 are currently pending in this application. Claims 1-28 were previously canceled in response to a Restriction Requirement. Claims 29, 42, 45, 47, and 50 have been amended. The status of the application in light of the Office Action mailed March 31, 2006, is as follows:

(A) Claims 29, 45, and 50 were objected to for minor informalities.

(B) Claims 29, 31-39, 41-45, 47, 49, and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,848,389 ("Gapp") in view of U.S. Patent No. 6,913,225 ("Arulf").

(C) Claims 40 and 48 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gapp in view of Arulf and in further view of U.S. Patent No. 4,556,591 ("Bannink").

As a preliminary matter, the undersigned would like to thank the Examiner for participating in telephonic interviews on May 2, 2006 and May 4, 2006. During the telephone interview, the Examiner and the undersigned discussed the pending claims and the applied references. Although no agreement was reached during the interview, the Examiner suggested that amending the claims to include no radial force being applied to the first structure might be allowable. Although the undersigned does not concede that this amendment is necessary for patentability, independent claims 29, 42, 45, and 47 have been amended to include this feature in an attempt to expedite prosecution.

Claims 29, 45, and 50 have also been amended to correct minor informalities. More specifically, claim 29 has been amended to include a colon after "wherein" to indicate that wherein applies to the three subsequent sub-elements of the claim. Claim 45 has been amended to change a colon to a semicolon to indicate that the preceding "wherein" applies

to all three sub-elements. Claim 50 has been amended to correct a minor typographical error.

A. Response to Rejections in View of Gapp

Claim 29 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gapp in view of Arluf. As described below, the rejection of claim 29 should be withdrawn because Gapp and Arluf do not disclose or suggest all of the features of this claim.

(1) Claim 32 is directed to a system that, *inter alia*, includes a composite material joined to a metallic material.

Amended claim 29 is directed toward a system of joined structures that includes a first structure that has a first aperture in a composite material. The first aperture has a first interior surface and a first minimum radial extent. The composite material is configured so that a small radial force to the first internal surface will damage the composite material. The system further includes a second structure that has a second aperture in a metallic material. The second aperture has a second interior surface and a second minimum radial extent at least approximately the same as the first minimum radial extent. The system still further include a coupling device that has a first shank section extending through the first aperture and a second shank section extending through the second aperture, but not extending into the first aperture. The first shank section of the coupling device has at least one of a hardness, toughness, and density greater than that of the second shank section of the coupling device, wherein (1) a portion of the second shank section has a greater radial extent than the first shank section, (2) the portion of the second shank section applies a first radial force to the second interior surface and the first shank section applies at least approximately no radial force to the first interior surface, and (3) the composite material proximate to the first aperture is undamaged.

- (2) Gapp discloses a bimetal rivet with expansion characteristics that insures a hole in a first plate and a hole in a second plate are both completely filled when the bimetal rivet is upset.

Gapp discloses a bimetal rivet that has a head or shank configured of a high strength metal, and a tail or head forming end made of a ductile metallic material (col. 1, lines 28-32). Additionally, the geometry at the point where the two different materials are joined facilitates the formation of the rivet head (col. 1, lines 51-57). The bimetallic rivet in Gapp allows two plates to be joined together so that a hole in the first plate and a hole in the second plate are both completely filled, providing a satisfactory rivet bearing configuration (col. 2, lines 27-41; col. 3, line 43-col. 4, line 15).

- (3) Arulf discloses threaded fasteners used to join a first construction element to a second construction element.

In Arulf, a first (female) threaded fastening element 26 is fixed to carbon fiber layers 23, 24 of a first construction part 21 via glue (col. 4, line 30-col. 5, line 17; Figure 2). A second (male) threaded fastening element 31 passes through a second construction element and is screwed into the first threaded fastening element 26 to join the first and second construction elements 21, 22 (col. 5, lines 18-46; Figure 2). Figure 1 of Arulf, which is relied upon by the Examiner, shows specially designed bolts 8 used to join a rotationally symmetrical first construction part 1 made of carbon fiber layers 3, 4 and a core material 5 with a ring-shaped second construction part 2 made of aluminum (col. 3, lines 45-61; Figure 1). Arulf specifically acknowledges that bolts or threaded fasteners and/or glue are the techniques used to join carbon fiber elements with aluminum elements (col. 1, lines 18-64).

- (4) Gapp and Arluf do not teach or suggest all the features of claim 29.

Gapp and Arulf fail to teach or suggest, *inter alia*, a coupling device that has a first shank section extending through a first aperture in a composite material and a second shank section extending through a second aperture in a metallic material, where the first

shank section of the coupling device has at least one of a hardness, toughness, and density greater than that of the second shank section of the coupling device, and wherein (1) a portion of the second shank section has a greater radial extent than the first shank section, (2) the portion of the second shank section applies a first radial force to the second interior surface and the first shank section applies at least approximately no radial force to the first interior surface, and (3) the composite material proximate to the first aperture is undamaged. In the above referenced Office Action, it is admitted that Gapp fails to disclose a system using a rivet to join two structures "wherein the first structure is a composite material, the composite material configured so that a small radial force to the first internal surface will damage the composite material . . ." The Office Action relies on Arulf to correct this deficiency. However, Arulf discloses using glue or threaded fasteners to join a carbon fiber material to an aluminum material; not a fastener such as a rivet or a fastener where (1) a portion of a second shank section has a greater radial extent than a first shank section, (2) the portion of the second shank section applies a first radial force to the second interior surface and the first shank section applies at least approximately no radial force to the first interior surface, and (3) the composite material proximate to the first aperture is undamaged. Accordingly, Gapp and Arulf do not support a *prima facie* case of obviousness under §103.

Furthermore, even if for the sake of argument Gapp and Arulf together did disclose all of the elements of claim 29, the combination of Gapp and Arulf is improper and cannot support an obviousness rejection of claim 29. The MPEP explains the fundamental criteria for an obviousness rejection under §103 as follows:

To establish a *prima facie* case of obviousness three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or

suggest all the claim limitations. **The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure.**

MPEP § 2142 (emphasis added). Additionally, the MPEP specifically warns that the Examiner must explain why one of ordinary skill in the art would be motivated to alter Gapp in view of Arulf to arrive at the claimed invention:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. Although a prior art device “may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so.”

MPEP § 2143.01, quoting *in re Mills*, 916 F.2d 680 (Fed. Cir. 1990). (Emphasis in original.)

Gapp discloses bimetal rivets for joining two plates together so that a hole in the first plate and a hole in the second plate are both completely filled, providing a satisfactory rivet bearing configuration. Arulf teaches a threaded fastener for joining two structures together and specifically notes that threaded fasteners and glue are the techniques used to join a composite material with a metallic material. Accordingly, there is nothing in either reference to motivate one skilled in the art to use the rivet in Gapp to replace the threaded fastener of Arulf. Additionally, without using the impermissible hindsight in light of the present application, there is nothing to suggest how such a combination would be accomplished. Accordingly, for at least this reason, the reliance on these references to support a rejection under Section 103 is improper.

Furthermore, again assuming for the sake of argument that Gapp and Arulf together disclose all of the elements of claim 29, the combination of these references would be improper because the purpose of each reference would be destroyed. The MPEP

specifically states that "If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." MPEP § 2143.01 citing *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). The purpose of Gapp is to provide a bimetal rivet for joining two plates together so that a hole in the first plate and a hole in the second plate are both completely filled, providing a satisfactory rivet bearing configuration. The purpose of Arulf is to reduce the number of threaded fasteners required to join a composite material to a metallic material by providing a threaded fastener that efficiently joins the two structures together. Accordingly, even if the Gapp rivet could be used to join the structures in Arulf, doing so would destroy the principle of operation of Arulf. Therefore, for at least this reason, the reliance on these references to support a rejection under Section 103 is improper.

Additionally, even if the Gapp rivet could be used to join the structures in Arulf, doing so would destroy the principle of operation of Arulf and Gapp because one of the structures would be damaged. As discussed in the Background section of the present application, current methods of joining a composite material to a metallic material include bolting the materials together or drilling an oversize hole in the composite material and joining the two structures with a rivet. More particularly, when riveting a composite material to a metallic material, a larger hole is drilled in the composite material than is drilled in the metallic material so that when a rivet is inserted and upset, the rivet does not contact the sides of the hole in the composite material, thereby damaging the composite material. In Gapp, the objective of the invention is to rivet two plates together so that the hole in the first plate and the hole in the second plate are both completely filled to provide a satisfactory rivet bearing configuration. Accordingly, using the Gapp rivet to join a composite material and a metallic material would result in damage to the composite material and would destroy the principle of operation of both Arulf and Gapp because neither reference intends for a structure to be damaged. Therefore, for at least this reason, the reliance on these references to support a rejection under Section 103 is improper.

Furthermore, even if the Gapp rivet could be used to join the structures in Arulf, doing so would destroy the principle of operation of Gapp because Gapp specifically teaches away from a rivet that does not completely fill both holes in the structures being joined. Gapp specifically identifies the configuration shown in Figure 1 (in which the rivet does not completely fill both holes) as being improper or unsuitable for joining structures (col. 2, lines 30-33; col. 1, lines 5-27). Modifying the Gapp rivet so that the composite material was not damaged would only be done by ignoring the teachings of Gapp and with the impermissible hindsight of the present application. Additionally, there is nothing in either reference to suggest or motivate the modification of the rivet in Gapp so that an improperly driven rivet is used to join two structures. Accordingly, modifying the Gapp rivet and using it to join a composite material and a metallic material would destroy the teachings of Gapp. Therefore, for at least this additional reason, even if for the sake of argument the combination of Gapp and Arulf taught all of the elements of claim 29, the combination of these references would be improper.

Claims 31-41 depend from claim 29 and, for this reason and for the additional features of these claims, claims 31-41 are also patentable over Gapp and Arulf. Amended independent claims 42, 45, and 47 contain features generally similar to those of claim 29 and, for this reason and for the additional features of these claims, claims 42, 45, and 47 are also patentable over Gapp and Arulf. Claims 43-44, claim 49, and claims 48 and 50 depend from claims 42, 45, and 47, respectively. For this reason and for the additional features of these claims, claims 43-44, claim 49, and claims 48 and 50 are also patentable over Gapp and Arulf.

In view of the foregoing, the pending claims comply with 35 U.S.C. § 112 and are patentable over the applied art. The applicant accordingly requests reconsideration of the application and a Notice of Allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to call the undersigned at (206) 359-6477.

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